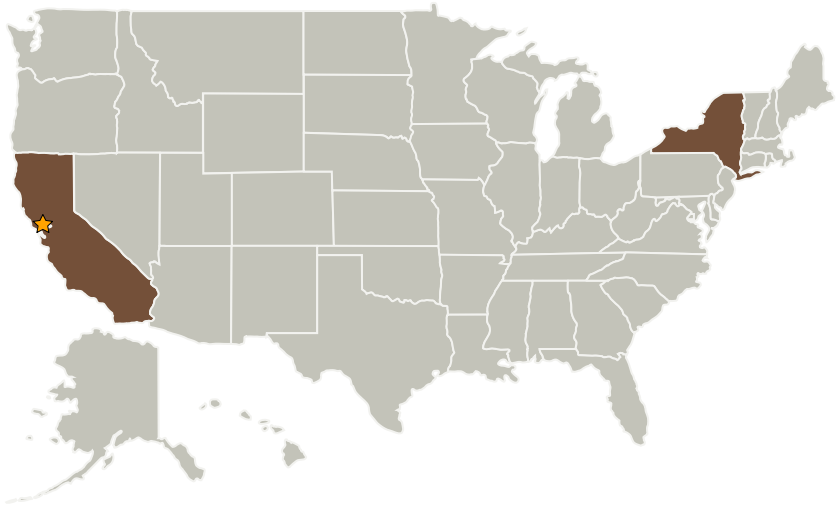
Integrating Prognostics in Automated Contingency Management Strategies for Advanced Aircraft Controls, Phase I

Completed Technology Project (2008 - 2009)

Project Introduction

Impact Technologies, in collaboration with Georgia Institute of Technology, proposes to develop and demonstrate innovative technologies to integrate prognostics into Automated Contingency Management (ACM) for advanced aircraft controls. Without consideration of prognostic information, the traditional reactive fault tolerant control approaches may fail to provide optimal fault mitigation/accommodation strategies over a longer period of time. The project team will create a platform level simulation environment that demonstrates the fault propagation from the component level, using electromechanical flight actuators (EMAs) as a testbench problem, to the high level flight envelope and mission objectives. The proposed ACM system accepts input from discrete diagnostics, grayscale diagnostics and prognostic modules and will be split into a real-time reactive component and a "planning" component that considers temporal parameters and the potential impact of being proactive with mitigating action. Specifically, innovative prognostics enhanced stochastic programming and receding horizon control techniques are proposed for high and low level ACM controllers respectively. A subset of core algorithms will be implemented on embedded systems and used in hardware-in-the-loop demonstrations to justify a Technology Readiness Level of 4.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Impact Technologies, LLC	Supporting Organization	Industry	Rochester, New York

Primary U.S. Work Locations	
California	New York

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.2 Test and Qualification
    - TX13.2.6 Advanced Life-Cycle Testing Techniques